What is claimed is:

1. An error correcting code decoding device based on Message-Passing decoding on a Low-Density Parity-Check Code, comprising:

a plurality of memory means for storing a received value and a message generated during said decoding;

a plurality of variable node function means in said decoding;

a plurality of check node function means in said decoding;

a plurality of address generation means for generating an address of said memory means; and

a plurality of shuffle network means for determining a connection between said variable node function means and said check node function means;

wherein said address generation means generates said address on the basis of a plurality of permutations and each of said shuffle network means being connected to some of said variable node function means, said connection being determined on the basis of a plurality of permutations, a change of said permutations in said address generation means and a change of said permutations in said shuffle network means being performed in the same cycle in a decoding process.

2. The error correcting code decoding device according to claim 1,

wherein said address generation means singly generates an address for all of said memory means; and

wherein said shuffle network means is singly connected to all of said variable node function means.

3. The error correcting code decoding device according to claim 1,

wherein said memory means stores said message with a sum thereof.

4. The error correcting code decoding device according to claim 1,

wherein said address generation means is provided as a counter.

5. The error correcting code decoding device according to claim 1,

wherein a permutation by said shuffle network means is determined on the basis of a Galois field calculation.

6. The error correcting code decoding device according to claim 1,

wherein said decoding corrects a message of an output from said check node function means by multiplying it by a coefficient less than 1 on the basis of the min-sum algorithm.

7. The error correcting code decoding device according to claim 1,

wherein in said decoding, said check node function means holds the minimum value of the absolute value of an input message

and an index thereof, and the second minimum value of the input message and information whether the input message is positive or negative on the basis of the min-sum algorithm.

8. The error correcting code decoding device according to claim 1,

wherein decoding on a different code is dealt with by changing only said address generation means.

9. The error correcting code decoding device according to claim 1,

wherein decoding on an uniform Low-Density Parity-Check Code is implemented by providing a function to always send a message that the output has a codeword bit with an extremely high probability of 0 to a set of said variable node function means corresponding to one of said address generation means and said shuffle network means.

10. A program to cause a computer to perform decoding on the basis of Message-Passing decoding on a Low-Density Parity-Check Code, wherein said program causes said computer to function as:

a plurality of variable node function means in said decoding;

a plurality of check node function means in said decoding;

address generation means for generating addresses of a plurality of memory means that store a received value and a message generated during said decoding, on the basis of a plurality permutations; and

shuffle network means for determining a connection between variable node function means and check node function means on the basis of a permutation changed in the same cycle as that of said address generation means.

11. The program according to claim 10,

wherein said memory means stores said message with a sum thereof.

12. The program according to claim 10,

wherein said program determines a permutation in said shuffle network means on the basis of a Galois field calculation.

13. The program according to claim 10,

wherein said decoding corrects a message of an output from said check node function means by multiplying it by a coefficient less than 1 on the basis of the min-sum algorithm.

14. The program according to claim 10,

wherein in said decoding, said check node function means holds the minimum value of the absolute value of an input message and an index thereof, and the second minimum value of the input message and information whether the input message is positive or negative on the basis of the min-sum algorithm.

15. The program according to claim 10,

wherein decoding on a different code is dealt with by changing only the function of said address generation means.

16. The program according to claim 10,

wherein decoding on an uniform Low-Density Parity-Check Code is implemented by providing a function to always send a message that the output has a codeword bit with an extremely high probability of 0 to a set of said variable node function means corresponding to one of said address generation means and said shuffle network means.

17. An error correcting code decoding method on the basis of Message-Passing decoding on a Low-Density Parity-Check Code, comprising the steps of:

generating an address of a memory storing a received value and a message generated during said decoding on the basis of a plurality of permutations;

connecting a plurality of variable node function in said decoding and a plurality of check node function in said decoding on the basis of a permutation changed in the same cycle as that of said address generation means.

18. The error correcting code decoding method according to claim 17,

wherein said memory stores a message with a sum thereof.

19. The error correcting code decoding method according to claim 17,

wherein a connection between a variable node function and a check node function is determined on the basis of a Galois field calculation.

20. The error correcting code decoding method according to claim 17,

wherein said decoding corrects a message of an output from said check node function by multiplying it by a coefficient less than 1 on the basis of the min-sum algorithm.

21. The error correcting code decoding method according to claim 17,

wherein in said decoding, said check node function holds the minimum value of the absolute value of an input message and an index thereof, and the second minimum value of the input message and information whether the input message is positive or negative on the basis of the min-sum algorithm.

22. The error correcting code decoding method according to claim 17,

wherein decoding on a different code is dealt with by changing address generation in memory.